ICSS

the superior student

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ISSUES IN HONORS

"Issues in Honors" by Robert C. Angell was the opening address of the ICSS Western Invitational Conference in Berkeley on April 10. The issues raised by the Director of the Honors Council at the University of Michigan are so central to the many emerging Honors programs that we wished to make the text of this address available as early as possible. It is, therefore, being printed now in advance of the full report of the Western Conference which will appear in the next newsletter, to be published in September.

A major issue is how to bring to bear on Honors work the educational research now available or being done and to determine what new research is needed. A report by Adam Yarmolinsky, RECOGNITION OF EXCELLENCE*, will help all who are seriously concerned with Honors programs. They will find this work valuable as a reference and as a source of insight into the rationale of Honors programs and problems of their evaluation. It could not, of course, deal with the specific problems on which effective research guidance is needed in large state colleges and universities—problems like the proper integration of general and departmental Honors through a four-year program as raised by Professor Angell; or like the best approach to interdisciplinary seminars, colloquia, or courses under two or more faculty members. The latter problem arises in the account presented below of the

*Working papers of a Project of the Edgar Stern Family Fund; Glencoe, Illinois: The Free Press, 1960; $3.75.

Michigan interdisciplinary science course.

Mr. Yarmolinsky surveys the current significant research on excellence and ways in which it is, and might be more effectively, identified and nurtured and its achievement recognized. He ranges from the elementary to the graduate levels. He goes beyond these into the sphere of fully matured excellence and its recognition here and in Europe. A great asset of the book is the documentation of the research discussed. The last third of the book is a series of comments on the present state of the art of recognizing excellence. They are full of cogent suggestions. The two longer papers by Nevitt Sanford of California and R. K. Merton of Columbia are particularly illuminating.

It is striking to note how much agreement there is among leading specialists in the behavioral sciences that our ignorance far outweighs our knowledge on the problems of excellence and its cultivation. A vast continent of new research problems awaits exploration.

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an experimental interdisciplinary course in science for gifted non-science majors*

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INTRODUCTION

Within the past few years science courses in liberal arts colleges have been undergoing re-evaluation. Since science and technology have become increasingly important in modern life, all educated individuals should have some basis for evaluating continuing developments in science.

In 1958 we were given the opportunity to develop a one-semester science course for sophomore non-science majors in the recently introduced Honors Program at The University of Michigan. Since the non-science major has a very limited contact with science, we tried to make maximum use of this contact. We agreed that a course for non-science majors based upon a sound understanding of a few underlying principles, developed rigorously, is superior to a survey course. No single course can convey a thorough knowledge of one science, much less of several sciences. However, certain scientific insights lend themselves to thorough developments from first principles without loss of rigor. Examples of such achievements can be found in all well-developed sciences. We feel that, for such a one-semester course, comprehension of these insights provides the best basis for appreciating current scientific developments. By appreciation of scientific developments, we mean the ability to understand the processes involved in scientific discovery to the extent of anticipating the next step.

Rather than confine the content of the course to a single scientific field, we have established an experimental interdisciplinary course. This four-credit-hour course is currently taught by a physicist, an astronomer, a geologist and a biologist, each of whom is actively engaged in research. It is designed to introduce the gifted non-science student to the types of thinking common to these sciences and to the inter-relations among them. It is not a survey course. Each scientist rigorously develops in depth those theories in his own field that contribute to a central theme which unites the course. The theme chosen was *Evolutionary Processes*, tracing in particular the evolution of stars, the solar system, the earth and life on the earth. This report discusses the organization and content, evaluation by students and staff, and possible modifications of the course which has been developed. Our experience with this course may be helpful in designing similar programs in the future.

*This report was made possible in part by funds granted by the Carnegie Corporation of New York. That corporation is not, however, the author, owner, publisher, or proprietor and is not to be understood as approving by its grant any of the statements or views expressed herein.

See an earlier statement by Professor Slobodkin on the interdisciplinary approach in science in the SUPERIOR STUDENT (November, 1958) 11.

ORGANIZATION AND CONTENT

Class lectures were given four times each week and were supplemented by less formal evening discussion sessions about once every three weeks. Generally, all four lecturers were present in class and at the evening sessions. The course was divided into a four-part sequence. Each lecturer delivered an uninterrupted series of from twelve to fifteen lectures, arranging his material in such a way as to assure continuity with the following lecturer.

The initial series of lectures was given by the physicist. He developed the fundamental physical concepts with which the remaining three lecturers could develop the central theme. In this section he started with crude experimental observations of motion and introduced the kinematical concepts needed to describe them unambiguously. Next came the more abstract concepts of mass and force which led to the formulation of laws governing motion. These were followed, at a more rapid rate, by other fundamental principles governing the behavior of mechanical, thermodynamic, electromagnetic, optical, atomic and nuclear phenomena, which would be assumed in the material presented by subsequent lecturers. The limitations, as well as the realm of applicability of theories explaining physical processes were emphasized. Demonstrations were presented wherever possible.

Using some of the physical concepts introduced, the astronomer oriented the class to his material by describing the content of the observable universe (i.e., stellar and interstellar matter, the general description of a galaxy and the clustering of galaxies). He then proceeded to a discussion of the quantities which can be regarded as "direct observables" (e.g., positions, brightnesses and spectra of stars). He then followed this presentation with a very rigorous discussion of the means by which such "indirect observables" as a star's mass, intrinsic luminosity, radius and chemical composition can be determined from the "direct observables". At this point, the students had the necessary background to begin the central theme of the course—evolution. After discussing the different possible types of universe (e.g., expanding, contracting, pulsating and steady-state), the astronomer proceeded to a discussion of the observational tests to which these possibilities can be subjected. Theories concerning the formation of galactic systems and groups of stars were presented and the evolution of individual stars was treated both from the theoretical and empirical points of view. Finally, the sun's life cycle was discussed, after which the origin of the sun was tied into the origin of the planetary system and consequently with the origin of the earth.

Starting with the proto-planet developed by the astronomer, the geologist surveyed the anatomy of the earth indicating the mineralogy, compositon and structure of its external crust and the probable structure and composition of its internal layers. He then developed the present concepts of the evolutionary processes causing changes in this anatomy throughout geologic time. Involved here were the processes of uplift, mountain-building, continental drift and the evolution of landforms through erosional processes. The concepts of geologic time, relative and absolute, were considered at length to illustrate the effectiveness of gradual earth processes when operating over immense spans of time and also to provide a time-setting for the development of life subsequently considered by the biologist.

The biologist presented the taxonomic and zoo-geographic data used by Darwin and Wallace, and developed the evolutionary theory initially in Darwinian terms. He then discussed the refinements of Darwinian evolution that have developed from recent advances in genetics and ecology. In genetics, particular emphasis was placed on population genetics and polygenic systems. Ecological information centered mainly on competition theory. Having established the theoretical necessity of evolution and, therefore, the necessity for the existence of some initial organism, he concluded the course with a summary of current theories of the origin of life. Emphasis was placed on the mechanism of evolution rather than on the history of life on earth.

Questions from both students and faculty played an important role in the course. During class, questions were permitted at the discretion of each individual lecturer. The questions which pertained directly to the lecture material were answered in class; any questions which would have required excessive digression by the lecturer were deferred for later discussion at an evening session. There was a general understanding that all questions were worthy of discussion, either immediately or in evening discussion. Occasionally questions arose which were not in the strict field of competence of the current lecturer. These questions were answered by the staff member best informed on that particular question.

An examination was given at the end of each of the four lecture sequences by the lecturer whose sequence had just been completed. As a result the four examinations were somewhat different in character. They ranged from true-false and multiple choice questions to problems, essay questions and a take-home examination. Examples of examination questions may be found in the Appendix.* Some questions on the take-home examination required the students to read original material published in professional journals. The performance of the students was essentially independent of the type of examination given.

The evening sessions were surprisingly effective supplements to the course. Although attendance was voluntary, at least eighty percent of the students were present at each evening meeting. When the staff felt that enough questions had accumulated to warrant an evening session, we arranged a date that was acceptable to all the staff members and to as many of the students as possible. Since the evening sessions lasted three or four hours, we arranged to meet in the comfortable surroundings of a dormitory lounge. Early in each evening meeting, answers were given to questions which had arisen during the formal class session but which had been deferred for lack of time. Later in the evening, more general discussion ensued.

At the end of the course a four-part final examination was given. Each staff member wrote and graded his own portion of it.

EVALUATION OF THE COURSE

After offering the course twice, we have certain definite impressions about its character and some of its possibly unique features. The students have also expressed their impressions to us, either in conversation or in anonymous critiques written in response to questions circulated both by us and by the University.

*See below, page 8.

The students reacted variously to the lack of a text. Some appreciated the opportunity to engage in varied reading. Others felt somewhat lost because they could not have a single text for reference.

All students were remarkably enthusiastic, and they seemed particularly pleased with the opportunity for close, informal association with staff members.

A small minority felt that the course went too fast, but in general the response concerning the pace was very favorable.

The majority of students indicated that by having four sciences taught in an integrated course, they were led to an appreciation of the inter-relationships among the disciplines and the transferability of ideas, not only between the scientific disciplines but between science in general and other fields of scholarship.

Most of the students emphasized the value of active discussion and differences in viewpoint which often arose among the four staff members. It became apparent, particularly during the evening sessions, that considerable effort was required by the staff as well as the students in order to grasp new concepts. This demonstrated two things: first, that many important ideas do not come easily; second, that the popular image of the omniscient scientist is a fiction.

The following remarks by the staff are concerned with some of the difficulties in carrying out our original plans. As indicated in the Introduction, one of our main aims in this course was to develop the students' comprehension of scientific insights. Our measure of success was the extent to which each student was able to anticipate the next step in the development of scientific concepts. Since the student's comprehension is indicated by his questions and comments, we thought it desirable to allow frequent interruptions during lectures. However, questions often tended to divert the class into channels other than those considered profitable by the lecturer at the time. Although common to many college courses, this problem was more acute in this course because of the high caliber of students and the fact that the lecturers were always receptive to questions. We anticipated the conflict between the lecturer's desire to answer questions and his intention to complete his lecture sequence on time, by leaving ten of the sixty class hours unprogrammed. These ten hours were kept in reserve to be used as needed to compensate for lecture time used in discussion. It turned out that the ten hours were just adequate. Each lecturer did indeed use a portion of this time. We think that the difficulty is an inescapable element in such a course.

Normally, each lecturer's vocabulary tended to include the specialized terminology and jargon characteristic of his field (e.g., cross-over distance, homologous stars, fermions, magna). The frequent discussions and debate, however, often compelled him to reformulate his remarks in simple English. In addition, penetrating questions sometimes required him to retrace his arguments all the way back to first principles, an effort profitable to both student and teacher ("Why is it meaningless to refer to 'the heat in a body'?" "How are similar species distinguished?").

The interdisciplinary character of the course was especially profitable to each staff member, for it enabled him to see familiar concepts applied by his colleagues in fields less familiar to him than his own. Moreover, the students profited by seeing a given concept applied to systems in different sciences. For example, the concept of entropy developed in physics reappeared with additional subtleties when applied to biological systems.

The most significant accomplishment, from our point of view, was the visible growth of the students' familiarity, understanding and competence in the use of fundamental principles. The students' questions were of much higher caliber than those arising in other undergraduate classes. ("In radiocarbon dating, how do you know that cosmic bombardment has been constant throughout geologic time?") The students' performance on examinations was superior to that of non-Honors students in introductory and beginning intermediate courses in science. (Many examination questions were borrowed from conventional course examinations, and the average grades were about twenty percent higher.)

POSSIBLE MODIFICATIONS

At the time of this writing, this course has been given twice. Both times it has been regarded as an experiment, at least in part. (Indeed, the first time the course was given, it was supported as an experiment by a grant from the Carnegie Corporation.) We think that the experiment has been successful and we expect to repeat the course in its present form. We realize, nevertheless, that such a program is more expensive than most undergraduate courses in terms of the student-to-staff ratio. (It is roughly four times as expensive as conventional courses at the University of Michigan.) We regard this expense as justified, although certain changes in the interest of economy may be necessary either here or at other institutions that may be considering a similar program.

In the following paragraphs we list our opinions on the desirability of six possible modifications:

1. Increase the number of subjects and lectures. We regard this as inadvisable. The first time the course was taught, five lecturers participated. They did not have sufficient time to develop adequately all necessary concepts. (Any attempt to go beyond five instructors would be an altogether different program from ours, rather than a modification.)

2. Decrease the number of lecturers. This is the least objectionable way to economize. The same range of material could be covered, with some change in emphasis, by two or three of the lecturers with at least one physical scientist and one natural scientist participating. However, the gain in economy is largely offset by the decrease of stimulating interaction among the lecturers and by the loss of depth and rigor in the subject matter.

3. Decrease the range of subjects presented. A course in *Evolutionary Processes* would suffer equally from the deletion of any one of the four disciplines. If physics were deleted, the other disciplines would need to introduce superficial analogies of the physical principles which they apply; if either astronomy or geology were not included continuity would be lost; if zoology were omitted, the most fascinating (non-physical) evolutionary concept, the origin and development of life, would be lost, and this now constitutes the climax of the course. On the other hand, a course of comparable quality might be designed around a different central theme which would require only three staff members. We feel that the advantages of an interdisciplinary course would be essentially lost with less than three lecturers.

4. Open the course to non-Honors students. In view of the depth and rigor with which the material is explored, the pace is too rapid for understanding and

retention in one semester by non-Honors students at the University of Michigan. On the other hand, two semesters devoted to the same material would probably be suitable for average students.

5. Offer the course to science majors. There is a strong likelihood that science majors (including non-Honors students) would profit from the interdisciplinary character of this course.

6. Increase or decrease the enrollment. We feel that the optimum student-to-staff ratio for a course of this nature is approximately 7:1. Decreasing the enrollment below about ten would be inefficient from the standpoint of effective teaching; increasing the enrollment over approximately forty would result in an undesirable decrease in opportunity for direct communication between individuals in the class and between individuals and lecturers.

Naturally, readers from other institutions will encounter other situations which we have not anticipated and, of course, they may need to adopt procedures different from those we have outlined here. Nevertheless, we hope that our experience may help in designing similar courses elsewhere, since we are convinced that they can be vastly superior to the prevailing versions of science education available to non-specialists in science.

APPENDIX: EXAMINATION QUESTIONS

Astronomy

(1) Contrast the explosive (big-bang) and steady-state universes in the following respects:

(a) Change of mean density with time.

(b) The reason why the density of galaxies does or does not appear to change systematically with distance.

(c) Imagine that you are looking at a very large volume of space anywhere in the universe. Contrast what you would see *now* with what you would see 10^{12} years from now if you live in an explosive (big-bang) universe as opposed to a steady-state universe.

(d) The fate of each type of universe.

(2) You have just been asked to derive the mass and luminosity for each of two stars in a visual binary system in order to plot them on the mass-luminosity relation. Both stars are easily observable separately and have moderately large proper motions in the sky. Describe what "direct observables" you will need and explain in an orderly, step-by-step account the procedure which you will follow in obtaining each star's:

(a) mass

(b) luminosity

Zoology

(1) A possible objection to the theory of evolution in its modern form is that many structures seem adept only in finished or half-finished form and could not have evolved by small steps. Why is this in disagreement with modern evolutionary theory? How do you answer the argument?

(2) Prove, by citing appropriate evidence and experiments, that hereditary material is particulate.

(3) The following four gene sequences have been reported on the 11th chromosome of Hairy Woozles (Wouzelius pubescens):

(a) EFGAJIHBCDKL

(b) ABCDEFGHIJKL

(c) DCBAEFGHIJKL

(d) AGFEJIHBCDKL

There is believed to exist (or have existed) a fifth gene sequence. This sequence must be (or must have been):

(e).....

The five gene sequences must be related to each other, evolutionarily, by the following relation (in which double arrows represent possible ancestral relations):

Physics

Show how simultaneity depends on the frame of reference of the observer, according to the Special Theory of Relativity. Describe a situation in which two reliable observers would disagree about the simultaneity of two events which they both observe.

Geology

(1) How might the following physical and geological concepts be associated?

(a) Convection currents in a cooling fluid *AND* intrusion of igneous rocks.

(b) $T = K\sqrt{L/g}$ and the crust of the earth.

(c) Half-life and the geologic time scale.

(d) Transverse or shear waves and the core of the earth.

(e) Archimedes Principle and mountain roots.

(f) Refraction and the "shadow zone."

(g) Density and salt domes.

(h) $F = K m_1 m_2/d^2$ and continental drift.

(2) Indicate whether the following statements are true or false:

(a) The contraction theory of mountain building does not explain the geographic distribution of mountain chains satisfactorily.

(b) Convection current theory depends on the fact that rocks are very poor conductors of heat.

(c) If a beam of continuous x-rays is passed through a stationary single crystal, then every set of atomic planes will give a reflection.

(d) Sedimentary rocks tend to thin as they are traced into mountainous regions.

(e) The recording of weak primary p-waves in the shadow zone is probably due to the presence of an inner solid core within the earth.

science for non-science majors

By **John Palfrey,** Dean
Columbia College

C. P. Snow has described the gulf between the cultures of science and the humanities. It is a gulf that is first created by neglect in primary schools, consolidated in high school and made largely unbridgeable in college, and is unbridgeable thereafter. The bridge, if it is to exist, has got to be built at the start. Science will not be the foreign, forbidding, impersonal subject it is to many an English major, if, in the next generation, every student is exposed to it as a central part of his early school experience and has it to get to know as an area for his natural curiosity.

With such a beginning, few students will reach college age with this sense of gulf between the cultures, and without some training or feel for the natural sciences. At that point, colleges can successfully provide an education in the liberal arts that includes explorations *in* science as well as *about* it, and an adult consideration of its place as part of our knowledge, our philosophy, our history, our politics and our future.*

While waiting for this development to occur, the colleges must nevertheless try to assimilate the new science into the liberal arts curriculum.**

The reason for many of the perplexities experienced by colleges in working out a science program, particularly for those not majoring in science, is that colleges have not defined sharply enough what they would like and are best equipped to accomplish. Most of them require courses in science for every undergraduate, and hope for the best. These requirements vary widely, but they tend to fall into one of two categories: required introductory courses in two or more fields of science, or else one or more general education courses in science.

Columbia College has followed the

*The preceding paragraphs are from an address delivered to the Columbia Associates, April 27, 1960.
The remainder of this discussion of the science curriculum is from **The College at Columbia University: Extracts from the report of the Dean of Columbia College for 1959, pages 3-5.

first of these approaches, despite its affinity for general education, after a series of experiments with "general" science courses in the late thirties and early forties, which were not continued after the war. The College, however, has not been fully satisfied with its present practice of requiring all students to take courses in two of the three categories in which the science courses are grouped.

However well planned and taught, many of these offerings have inherent limitations. Students are usually not provided with the personal experience of doing laboratory work and gaining at least a sense of method and approach to the subject. The courses are generally designed for those not going on in the field, who therefore are never exposed to the enthusiasm and talents of future scientists. Thereafter, the College, having provided this necessarily simplified introduction to a science, does nothing more about it. Students are not called upon to go a step further in any one field, or to relate it to any other area of science or to any outside subject with which they are familiar, or to consider scientific knowledge in the broader context of contemporary civilization.

The second approach of liberal arts colleges is to require students to take "general" science courses, also designed mainly for the non-scientist, which are difficult to teach meaningfully without the foundation which the first approach seeks to provide. These courses, presented as a sequential introduction to a number of sciences, or as representative case studies in science, are designed to give the student a sense of what science is about and of its place in the scheme of things. Usually these courses are concerned with the broad reaches of the sciences, in an historical or philosophic context.

Such courses have been tried at Columbia, but have been regarded by its science departments as an unsatisfactory way of introducing science to a non-scientist. They are regarded as courses *about* science—in general education, in history and in philosophy—but not as courses *in* science.

The dilemma of the liberal arts colleges is that they generally find time in their curriculum to provide only one type of offering for the non-scientist, and yet would like to do two things at once—to make all those with a liberal education literate in mathematics and at least one science, and at the same time to make them aware of science's broader implications in the world today. It seems to me that a liberal arts college should concentrate more on the second of these aims, but in order to make it feasible should expect more and demand more of the secondary schools to do the first, and assist them in achieving it. The schools are better equipped, in sciences as in foreign languages, to provide the foundations and the tools for higher learning. A first-rate course in high school physics would have what a college course is likely to lack: small classes, laboratory work, and the enlivening presence of future scientists.

If the student body as a whole arrived at college thus equipped, literate in science and with grounding in mathematics, and then had this training consolidated in the freshman year, the science departments would feel quite differently about offering, perhaps requiring, courses in the philosophy or history of science, or participating in seminars about science and society.

Furthermore, these could become courses of importance for science majors as well. In addition to their specialities, such students would be concerned with the foreign relations of physics or chemistry or biology, asked to think philo-

sophically about their own discipline, and to identify its interconnections with other sciences. They would meanwhile be learning from, as well as teaching, students of history and philosophy and the humanities, who themselves would know enough of science to participate meaningfully in the examination of common problems of man's knowledge of himself and of the world he inhabits.

conference on superior students in science and mathematics

On May 12-13, 1960, a conference on Special Programs in Science and Mathematics in Large Universities was held at the University of Kansas. It was supported by the National Science Foundation. On the assumption that university scientists have been less active in programs for the highly able undergraduate than social scientists and humanists, this conference focussed its attention upon science and mathematics. Assuming also that the larger state universities—with their flourishing graduate schools and with relatively little formal selectivity in undergraduate admission—have different problems from those of other types of colleges, it concentrated upon the large state universities.

The deans of Arts and Sciences in thirty major state universities were each asked to nominate a faculty member in science or mathematics interested in opportunities for the highly able undergraduate in science. With the addition of a few consultants and several representatives of the National Science Foundation, about forty people devoted a day and a half to a consideration of the adequacy of present science programs for the needs of the most able undergraduates.

In general, the conference arrived at such conclusions as the following:

1. The large state universities will take care of much of the increased enrollment of the 1960's. Their student bodies will be relatively heterogeneous, but will include substantial numbers of very able students. Thus special provisions for these superior students in science are essential.

2. There is widespread interest in special programs for the superior student, but most programs are new and, it was agreed, present provisions are grossly inadequate.

3. Much variation and flexibility are necessary among our universities. Similar flexibility for individual superior students is needed within each university. A rigid curriculum for them in science is undesirable.

4. The provision of the necessary programs for superior students requires faculty and facilities. Since current programs cannot be sacrificed and since the faculty-student ratio in science is already high, the conference concluded that additional financial support—from state government, from private foundations and from the federal government—is highly desirable and in most state universities may be absolutely necessary. Certainly some special provision for the necessary preliminary experimental programs is required.

A report summarizing the findings of the conference is being prepared by the conference steering committee and will soon be printed and distributed. Copies may be obtained from Dean G. R. Waggoner of the University of Kansas.

science research training program—providence college

by
Rev. **Frederick C. Hickey,** O.P.
Director, Honors Science Program
Providence College

In recognition of the urgent need for more, well-trained research workers in the fields allied to the health sciences, the National Institutes of Health will support an experiment in the undergraduate training of exceptionally able students at Providence College. The program will last five years.

Two concentrations will be offered, one in biology, the other in physics and chemistry. All students, irrespective of their concentration, will receive broad and intensive instruction in mathematics, physics, chemistry and biology. A generous portion of the student's time will be devoted to non-scientific cultural courses (foreign language, English, history and philosophy).

The ideal of the program is to move students through their educational training at a maximum pace commensurate with their abilities. Hence, no definite duration will be assigned to any specific course. Instead, as soon as it is evident that the student has received the maximum benefit from a given course, he will move on to the next more advanced one whether or not a full semester has been completed.

The curriculum incorporates several innovations. The major portion of the science class work will be concentrated into the first two years. The final two years, including the summers after the sophomore and junior years, will be predominantly devoted to actual research in the field of the student's choice. Provision is also made for the temporary transfer of students to other institutions for specialized training and advanced courses.

Only eighteen students will be admitted to the Experimental Honors Research Training Program each year. They will be selected on the basis of the following: exceptional academic records in high school, the recommendations of their high school principals and teachers, their records on the College Entrance Board examinations and personal interviews. Not only high scholastic ability but a sincere enthusiasm for scientific research will be sought for in candidates.

The grant will provide tuition, laboratory fees and room and board where required. Stipends are also granted for summer research work.

The accelerated pace and greater intensity of the courses will require a considerable amount of personal tutorial instruction on the part of the professorial staff. For this reason, and to allow expansion of the research program at Providence College, one additional staff member will be added to each of the four science faculties.

In supporting this program, the National Institutes of Health are embarking on an experiment in scientific education at the undergraduate level. It is hoped that the results of the trial at Providence College will justify the extension of the program to many other colleges in the future.

two university of illinois professional school programs*

In Agriculture

Excerpts of a letter from **John Titus**
Chairman, Honors Council
College of Agriculture, University of Illinois

The Honors program in the College of Agriculture at the University of Illinois is part of a University-wide Honors program under the direction of Professor R. E. Johnson. Most of the Colleges on this campus are developing programs for their own students which are integrated through the Faculty Honors Council. The program in Agriculture is directed through a six-member College Honors Council—two of whom are members of the Faculty Honors Council.

In the College of Agriculture we have established our own selection procedure to designate Honors students at the beginning of the second semester of the freshman year. Promising students, selected on the basis of high school records, aptitude tests and first semester mid-term grades are invited to apply for the Honors Program in December. Those who apply and whose academic performance is superior during the first semester are designated as Honors Students. This group comes from the upper ten percent of the freshman class.

The Honors Students are required to participate in a freshman Honors seminar during the second semester. This seminar does not purport to replace any technical area or subject matter taught within the college. This year the group, whose academic interests range from agronomy to veterinary physiology, including home economics, is making a study of the agriculture, economy and political structure of some dozen foreign countries. The subject matter is not so important as the library experience, the critical evaluation of the materials covered, the oral presentations and earnest discussions following them and the written reports which are required. One of the very gratifying reactions to this seminar has been the students' awakened interest in literature, economics, history and politics.

A sophomore seminar for this same group is now being organized under the leadership of one of the keenest men on our staff. It will involve, we hope, a close relationship between the students and several outstanding faculty members in our college. Honors students participating in this seminar will be given the opportunity to develop a deeper understanding of what has motivated these men, what aspects of their training have contributed to the progress they have made in their research, and how their own horizons have been broadened by developments in other arts and sciences.

A junior year program is developing which will require Honors students in Agriculture to participate actively in one or more Honors courses in one of the other Colleges of the University.

At the present time we are not attempting to emphasize specialization through the Honors Program since this is generally encouraged in our departmental curricula. We have had available for some years a program in Agricultural Science which provides a solid background in basic sciences and greater flexibility than most of the departmental

*For earlier accounts of the University of Illinois All-University Honors Program see THE SUPERIOR STUDENT, (March, 1959) 10, (January, 1960) 9.

curricula. Since this program was designed for students preparing for graduate study many Honors students will be encouraged to follow this curriculum.

The most difficult problem has been the selection of staff members to direct the seminars. So far we have been very fortunate in being able to interest extremely well qualified people to participate in the program—or at least people who the members of the council have felt would be qualified. Unfortunately, these are just the people who are qualified for, and deeply involved in, other serious undertakings. Our experience has been that Honors teaching is far more demanding than other fields of instruction. More than a mastery of the subject matter is required in order to challenge constantly the students whose curiosity and interest require more of the instructor than the prepared lecture. However, this extra effort is mitigated to some extent by the stimulation which our faculty members have found in working with these students.

In Business: Honors Objectives

by **Walter W. McMahon**
Director, Honors Program
College of Commerce and
Business Administration
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Undergraduate professional colleges* are attracting over half of the students** earning degrees in the United States and are also attracting many of the ablest students. It is in these colleges that Honors programs are "most needed" in the view of Vice President Harrington of the University of Wisconsin.*** Yet it is in the undergraduate professional colleges that Honors programs are only just beginning to develop. They seek to take advantage of the superior capacity of Honors students to learn more quickly and to handle analyses of greater difficulty than the average student.

The discussion which follows is largely based on experience with the Honors Program in the College of Commerce and Business Administration at the University of Illinois. This program seeks to further the aims of professional education within the framework suggested by the ICSS.****

HONORS OBJECTIVES AND PROFESSIONAL AIMS

Professional education differs from liberal or general education primarily in its greater emphasis on the utilization of knowledge. Both foster the pursuit of truth and encourage efforts to serve the common good. But professional education seeks to avoid the extremes of acquiring knowledge entirely for its own sake or of emphasizing the application of knowledge to the point of teaching only how-to-do-it.

To serve the aims of both liberal and professional education, Honors programs in professional schools should seek to combine the following objectives: 1) the search for truth taken from the tradition in liberal education, 2) the concern of professional education that knowledge be useful and relevant, and

*The term "professional college" will be used for brevity to refer to non-liberal arts undergraduate colleges in general, but will exclude such colleges as Law and Medicine which present different problems for Honors work because of the graduate level of instruction.
Computed from "Earned Degrees Conferred", Chapter 4, Statistics of Higher Education, **Biennial Survey of Education, U. S. Office of Education, 1958, 76-103.
***"What About the Professional Schools?—Where Honors Programs Are Most Needed," THE SUPERIOR STUDENT (February, 1959) 2.
****See THE SUPERIOR STUDENT (October, 1959) 4.

3) the Honors goal of maximum utilization of the intellectual capacities of superior students.

The Honors Council has set itself certain objectives by means of which it hopes to implement these general aims. The first is development of analytical ability and application of this ability in the attainment of knowledge about the fundamental variables within an area of specialization. The Honors student is further encouraged to engage in original, independent thinking about the basic forces operating in any given field, so that data about current developments can be interpreted in the light of knowledge of fundamental relationships. He can also benefit from research experience that encourages objective analysis of assembled information and original solutions to problems. This experience is directly relevant, since many business decisions are now made on the basis of extensive studies which are essentially research efforts.

To achieve this objective, carefully selected freshman Honors students are encouraged but not required to enroll in special sections of the large multi-section courses. These sections have an analytical approach and probe deeply rather than cover a large volume of material. The intellectual challenge and exploration of underlying assumptions in this classroom atmosphere have resulted in an enthusiastic student response. Given a free choice, all have elected to continue in Honors sections in the succeeding semesters. They now trust a policy which avoids coercion and which results in grades that are comparable to what they would have attained in a regular section.

In addition to the Honors sections, advisers encourage Commerce Honors students to select challenging, analytically-oriented courses, and all have been made aware of additional Honors sections available elsewhere in the university. Many take logic and are continuing mathematics through advanced calculus, matrices and differential equations.

Senior Honors students will be encouraged to engage in research projects with faculty members and to write research papers. Honors courses providing for research experience have existed for many years in each department. They should be used more intensively than they are at present as the first Honors group reaches the senior year.

A second important Honors objective is to provide the Honors student with a better background in the liberal arts and sciences. His abilities should not be channeled only into increased specialization or acceleration. Although specialization increases efficiency through division of labor, if it is not supplemented with a broadening of perspectives it can lead to discord, to incomplete development of potential and to limited participation in the intellectual life of our society.

To promote liberalization, enrollment is encouraged in a well balanced nucleus of courses in the humanities, natural sciences and social sciences. As it turned out, the first group of Honors students, although firmly committed to preparing for a career, also had strong interests in the sciences and the humanities.

Another means of broadening perspectives is through an informal program involving attendance by the Honors group at cultural events, such as university lectures, concerts or plays. The purpose is not only to introduce freshmen to cultural opportunities but also to create opportunities for informal student-faculty discussions in faculty homes. Since the students have shown interest in organizing the informal program themselves, it has also proved useful in providing some leadership experience.

Liberalization will be further imple-

mented through a problem-centered interdisciplinary Honors colloquium for juniors and seniors. Since it is the first of its kind to be proposed at the University of Illinois, specific comment will be deferred. But, in general, Honors colloquia are key points at which the all-university approach at Illinois has some major advantages. They can facilitate cooperation among the undergraduate professional colleges and the College of Liberal Arts and Sciences, and can thereby add breadth to departmental or college sponsored programs. The College of Commerce and Business Administration, for example, is considering an Honors seminar in the behavioral sciences which should draw students from other colleges as well as Commerce students. A major advantage in locating Honors colloquia in professional colleges is the greater ease with which they can then become a part of the curricula of professional school Honors students.

The greatest unexplored opportunities for Honors work lie in the professional colleges. But Honors work can fall short of its potential in either professional or liberal arts colleges. The curriculum flexibility which it introduces can be wasted if there are no clearly articulated Honors objectives that press for high standards and high quality. With a clear sense of purpose, professional school Honors programs are in a position to utilize a strong tradition and to make a unique contribution. They should be best equipped to take a basic idea, such as the encouragement of excellence through Honors work, add to it an element of usefulness, and combine it with a quest for results guided by a clearly conceived set of values.

distinctive features of the university of wisconsin honors program*

Last year the faculty of the College of Letters and Science at the University of Wisconsin authorized its Honors Committee, under the chairmanship of Professor Alvin Whitley, to proceed with the implementation of a full, four-year Honors Program to begin for freshmen and sophomores in September, 1960, and for upperclassmen in September, 1961. In recommending the program, the Honors Committee made the following appeal directly to the citizens of Wisconsin:

"We believe the citizens of the State of Wisconsin will wish their State University to provide a suitably improved education for those of their sons and daughters with unusual talents. We feel that the attention given to such students has not been developed or maintained adequately as the general program of the College has been altered and improved in recent years. The senior faculty of the College has given more and more of its individual attention to its graduate

*From faculty reports. A program will be inaugurated next year on the Milwaukee campus under the chairmanship of Professor Herman Well.

students. From them it may now have the satisfaction and sense of accomplishment it formerly had in working with the most gifted undergraduates. The latter appear to have been the chief victims of this change in emphasis. These superior undergraduates, in proportion much more our own Wisconsin people than are our graduate students, may be the most precious resources we have. They should not feel it necessary to go elsewhere to find the opportunity and challenge they deserve at home."

The faculty enabling legislation particularly provided that the program was not to begin unless sufficient funds were made available to cover all instructional and administrative costs necessary for a satisfactory program. In addition, in any year in which funds are not sufficient the Honors Committee is to report to the faculty and ask for advice. The Honors Committee now reports that it has been assured by the Administration that the program will be fully and specifically budgeted.

Each departmental chairman will include in his budget the specific cost of Honors work in his department. This amount will not be isolated from other items but will appear as a regular part of the budget and thus be subject to the usual budgetary negotiations.

Participating students will be selected from the upper five percent to ten percent of the undergraduates in the College. Students may apply for entry to the program on their own initiative or may be recommended by any faculty member during any semester of their undergraduate careers.

In order to receive Honors credit a student must be certified as an Honors candidate by the committee. Freshmen will be certified on the basis of academic scholarship awards, high school grades, test scores, recommendations and personal interviews. Other students will be certified when they qualify on the basis of their college work. Students may withdraw or be dropped from the program without prejudice.

The Honors Committee has been working with the departments to determine what courses and procedures should be made available for Honors students. For the coming year, twenty-nine departments have tentatively committed themselves to offering 118 semester courses. Thirty-four are new courses especially designed for Honors candidates, and others are separate sections of existing courses, special laboratory or discussion sections, or individual tutorials.

Departmental programs are scheduled to begin in 1961-62. Existing departmental opportunities for their superior majors will be strengthened and new procedures added. Insofar as possible Honors candidates will be grouped with departmental majors who excel in the particular field but whose excellence is not of sufficient breadth to qualify them as Honors candidates. Whenever the total number of such students in a given field is large enough, special seminars, colloquia and courses will be offered. For all upperclass Honors students there will be considerable independent work under professorial guidance, much flexibility in credits and hours, and a senior thesis, or its equivalent.

In addition, unusual opportunities for more advanced and intensive work by Honors students are available through the association of graduate students with undergraduates in upper level courses, and there is the possibility of admitting advanced undergraduates to graduate courses and seminars.

Students who at the end of their sophomore year are in good standing as Honors students, have successfully completed at least twenty credits of work under

Honors procedures, and are recommended by the Honors Committee will be awarded *Sophomore Honors*. This will make it possible to recognize superior work by students not proceeding to further study in the College of Letters and Science.

All students who have participated in Honors procedures will have all grades earned (or all courses taken) under such procedures given a special designation on their transcripts, and *all* transcripts will indicate that there are such special Honors procedures and Honors degrees.

issues in honors

by **Robert C. Angell,**
Director, Honors Council
University of Michigan

The following is the text of the opening address delivered at the ICSS Western Invitational Conference in Berkeley, California, April 10, 1960.

My title assumes that the commitment to Honors work has already been made. There is, of course, the previous issue of whether Honors work should be done at all. There are still those who think that it is undemocratic to single out the best students for special attention, though oddly enough they don't seem to think it wrong to impose high standards for college admission. Their theory seems to be that it is all right to have a carefully chosen intellectual squad, but it is improper to have a first team. Interestingly, the doubt about the social justice of Honors work seems most frequent among the Honors students themselves. A dead-level theory of democracy—to me a mistaken theory—is giving them a guilty conscience.

SHOULD HONORS BEGIN WITH FRESHMEN?

The first of the five issues I should like to discuss is given by the question: Who should participate in Honors work? The answer to this question necessitates answers to three sub-questions, the first of which is: At what point in the academic career should an Honors program start? When we adopted our College Honors Program at Michigan in 1957 we decided to take in students as entering freshmen. Our experience of the last three years has made me appreciate the arguments against our policy as well as those supporting it.

One of the strongest reasons for starting with freshmen is that you avoid the possibility that your brightest students will find college work boring. Actually it was the criticism from superior upperclassmen that the first two years' work at Michigan was not challenging enough that, more than anything else, led to the establishment of the College Honors Program. There was evidence that such students sometimes turned to enterprises like the *Michigan Daily* to find intellectual adventure.

The main counter-argument is that one cannot do an accurate enough job of selection among entering freshmen to make the system work well. A good many are

chosen who will not perform up to expectations, and a good many are passed by who will excel. It is true that one can make much better predictions about academic success after the students have been through a semester or two quarters. Furthermore, it would be almost impossible in a large institution to make the selection of a whole class during the academic year. There is just too much red tape to getting the marks, deciding who should be invited to join the program and registering them in Honors classes. This means that in practice one would have to wait until the sophomore year. And even then the selection would not be perfect, for there are many late bloomers who do not show their ability until they are half way through college.

The truth of the matter is that a sifting process goes on throughout the four years, with some of the seemingly potential champions falling by the wayside and a good many originally unpromising youngsters coming to the fore. The longer the selection is delayed, the better will be the batting average in Honors degrees. But, also, the more frustration, dissatisfaction and lost achievement there will be among the large number who could have been selected earlier and would have performed well until graduation.

An objection that might be raised against early selection is that having to drop the unsuccessful is too damaging to their egos. We have seen little evidence of this at Ann Arbor. The unsuccessful students realize that they are over their heads and are very sensible about returning to normal university status.

Although we have not yet been through four years of our program and so cannot see the full cycle, I think we will continue to take entering freshmen. About one in six fails to make a B average in his freshman year, and a very few more drop out as sophomores. But that gives us a large majority of our original class who are finding that they can take advantage of the opportunities offered them and can go on to work for an Honors degree in a department or field of concentration. A side benefit that underclass Honors work produces is satisfaction on the part of professors. At the end of the past semester a political scientist and a mathematician sought me out to tell me how much they enjoyed teaching Honors freshmen, and a philosophy professor spoke in the same vein about a sophomore Honors class in logic.

SHOULD LATE BLOOMERS BE ADDED?

I have already implicitly answered the second sub-question under the first issue, to-wit: whether new students should be added to the program as they show the ability to do superior academic work. I believe that they should. Any disruption that is thus caused is more than offset by the value to the newly chosen students.

We do not yet know how much handicapped those who enter the program as juniors are in competition with those who have been Honors students as underclassmen. There is already some evidence that the latter group take more easily to upperclass Honors work. If this proves to be true, it will simply mean that we will have to tighten our standards of admission at the junior level.

HOW ARE HONORS STUDENTS IDENTIFIED?

The third sub-question is: How does one identify students of Honors caliber? In my opinion one has to rely mainly on academic averages and test batteries, weighted about equally. With entering freshmen I have come to the conclusion that no student from a public school, no matter what his test scores, should be admitted at entrance unless he was in

the upper five percent of his class. (This can be relaxed to ten percent for good, private schools.) Conversely, even if the high school record were perfect, I would not admit him unless he showed on tests the equivalent of a College Board score of 630. The great majority of freshmen whom we took last fall averaged above 650 and were in the upper two percent of their high school classes.

Our experience suggests that recommendations of high school principals are not very helpful, except negatively. Principals and counselors naturally speak very highly of the upper five per cent of a class, and yet this is too large a group for College Honors. However, when they do not recommend highly a seemingly very good student, be careful. It often means there are emotional instabilities present that may handicap him in college. More helpful are indications of intellectual curiosity and creativity that appear in what the student reveals in his free answers on the admission blank. Those who have done field studies in biology, have built electronic equipment, have tried to write novels or epic poems or who want to study Chinese are likely to be excellent prospects.

Incidentally, research is going on at various places, including Michigan, with a view to perfecting tests of creativity or critical thinking. If this research succeeds, we will have an added tool for selection, and perhaps an added criterion for retention.

ENRICHMENT OR ACCELERATION?

The second issue I would like to pose is whether the emphasis should be on enrichment or acceleration? Notice I have said emphasis, because this is not really an either-or question. Although we put the emphasis on enrichment at Michigan, we cannot prevent some acceleration. In the first place, a number of our students have qualified for credit under the Advanced Placement Program through courses taken in high school. Second, mathematics seems more suited to acceleration than enrichment—at least so our mathematicians believe. Third, our summer reading program allows Honors students to take a course each year out of residence. And fourth, it is difficult to discourage many of them from taking extra courses during the school year. The upshot is that four of our first class are graduating in three years, and many more will graduate in three and one half years. This sort of irresistible acceleration is creating many problems for institutions that have thought of four years of college experience as sacrosanct.

There are those, however,—some of them in my own university—who think we should not allow acceleration grudgingly but should welcome it. They argue that some students know more when they enter college than others do when they graduate and conclude that the able ones should get ahead into graduate or professional work as soon as possible. The rejoinder to this of most members of our Honors Council is that acceleration leads to earlier specialization and that this is not what our country needs from its brightest students. They point to the fact that we have rarely produced students having the breadth and depth of an Oxford education and say that Honors work in college gives us an opportunity to approach this standard. Hence they want the courses for Honors students to be more thorough than regular courses. Instead of merely learning the formula, the students should see how it is derived. Instead of learning the generalizations in a textbook in sociology, they should delve into the monographs that produced the generalizations. Instead of reading

three Elizabethan authors in a semester, they should read five. Some feel they should have greater mastery of tools, too. It has been suggested in our Council, for instance, that we should require of Honors students proficiency in two foreign languages instead of one.

So far as I am concerned, I am persuaded that for our situation at Ann Arbor, the emphasis should be on enrichment. In technical schools, it may be better to give priority to acceleration. At least the issue is an important one that should be faced by all those considering Honors programs.

WHAT IS THE RELATION BETWEEN DEPARTMENTAL AND GENERAL PROGRAMS?

A third issue, and perhaps the most difficult of all to resolve, is what should be the relation between the departments and a college-wide Honors program. When only upperclass Honors work is undertaken, the usual policy has been to let each department run its own show, with only a minimum of supervision from a college committee on Honors. Often there has been no insistence that all departments offer Honors degrees, but only those that wished to. But when underclass Honors work is undertaken as well, there has to be a different policy, if for no other reason than that someone has to take responsibility for the underclass Honors students, many of whom will not yet know what their department of concentration is going to be. There seem to be three possible policies. One is to transfer responsibility for all Honors work to a college-wide body of some kind; the second is to put the underclass Honors work under such a body, but to leave the upperclass Honors work to departments; and the third is to put general responsibility in the hands of an Honors Council, but with much authority delegated to departments at the upperclass level.

The advantage of the first alternative is clear. It is administratively simple—probably deceptively so. It makes possible clear policies on curricula and degrees. The Honors Council may insist on the curtailment of excessive specialization and see to it that those who earn Honors degrees have true breadth, that they qualify for what is often termed General Honors. Perhaps the most serious defect in this solution to the problem is that you cannot get many college faculties to accept it. The departmental tradition is too strong in most of our institutions. The belief in the importance for the best students of extensive knowledge in a single discipline is so widespread that the departments would rarely relinquish control. And I am not arguing that they should. There is certainly here a real dilemma, either horn of which has its disadvantages.

A simple way out, but I am not sure an effective one, is to split the authority at the mid-point of the student's college career, giving an Honors Council control over the first two years, and the departments over the last two. This can probably be sold to most faculties, but I think there are serious drawbacks. For one thing, there is likely to be a lack of coordination between the two halves of the program. If some departments decide not to offer Honors degrees, there will be disappointment among students who have come up through the underclass Honors program when they find no Honors opportunities in their field of concentration. But even when they find they can go on to an Honors degree, the students who have experienced the underclass program may well be unhappy about the lack of opportunities for Honors work outside their fields of concen-

tration. If the departments are in complete charge in the last two years they are unlikely to worry about giving Honors opportunities to any but their own concentrating students.

It is such considerations as these that make it seem desirable for an Honors Council and the departments to share in some way the responsibility at the upperclass level. At Colorado this has been worked out by having two sorts of degrees, Departmental Honors and General Honors, administered somewhat independently, though a particular student may be a candidate for both. Even if a student decides not to take General Honors, he still has available to him interdisciplinary colloquia that give him greater breadth than a departmental Honors concentration would give him in schools having no General Honors program.

We at Michigan are trying another scheme, though it is too soon to say how successful it will be. Our Honors Council has general charge of the whole four year program, but it has delegated much of the responsibility for the upperclass program to the departments. The Council sets general standards for admission to candidacy for Honors degrees, exercises some supervision over the sorts of opportunities offered by departments and sets the general standards for awarding degrees. Moreover, the Honors Council is stimulating the development of Honors opportunities outside the field of a student's concentration. These are of two kinds: departments are being urged to nominate two or three courses that are particularly suitable for able nonconcentrates in the hope that these courses will gradually take on an Honors character; and a small number of special interdisciplinary courses at the upperclass level are being fostered by the Honors Council. It is our hope that we can counsel our students to elect these courses in sufficient numbers to make an Honors degree represent b r e a d t h throughout the four years as well as the specialized depth obtained through Honors concentration.

HOW CAN EXCELLENCE BE CULTIVATED WITHIN LARGE-SCALE BUREAUCRACY?

My fourth issue is perhaps not properly so called. It is not something on which men take sides. Rather it is a problem. It is posed by the question: How do we cultivate excellence in the midst of large-scale bureaucracy? This is a problem to which I have no easy answers, and I doubt that there are any. In institutions of thousands of students even Honors work can hardly duplicate the proverbial situation of the log, the student and Mark Hopkins.

What are some of the bureaucratic obstacles? One of the principal ones is that we are caught in the credit-hour-and-grade system. So long as most of our best students go on to professional and graduate schools, we cannot hope to break away. These schools will demand an accounting from the undergraduate college, and it is unfair to the student not to provide it. The possibility that this accounting might take a more qualitative form seems, at the moment, remote.

More discouraging, even if we were not under pressure from professional and graduate schools, we would still have to rely on marks as criteria for success in our Honors work. Most of us recognize that not all A's represent imaginative and critical scholarship and that many a student of true originality performs unevenly in terms of grades. We would like to replace grades with criteria more suitable to our purpose. In small schools this can be done. All the professors who have had a particular student can confer

and reach a consensus on his Honors potential. In large institutions that is simply impossible, and to do it through recommendation forms would just add to the red tape. There is hope that tests of imagination, creativity or critical thinking will soon come to aid us in the screening process, but for the moment we are stuck with marks.

These obstacles, serious though they are, do not, however, prevent the attainment of excellence in education. A clever and imaginative faculty can accomplish wonders even with a huge, bureaucratic system which rates students by course credits and letter grades.

Implicit in all my discussion has been the belief that for much of their work Honors students need to be segregated in separate classes. It is unfair to overworked faculty members to ask them to give special attention to Honors students who are mixed with other students in regular classes. Occasionally the teachers will be willing to do this, but a whole Honors program cannot be based on this arrangement. Nor is it good enough, I think, to have Honors work merely supplemental to a regular student course load in the form of special interdisciplinary colloquia elected as extras. Such colloquia are fine educational experiences, but there should be Honors level work in courses in the usual disciplines too.

More important than anything else is good teaching. For the superior students this does not often mean listening to lectures, no matter how learned and polished. Superior students profit much more from the interchange of a well led discussion, from an apprentice relationship to a professor in the laboratory or from the preparation of papers which can be discussed in tutorial conferences. These forms of education are more costly, but when their full potential is realized they are well worth the cost.

The interdisciplinary course seems particularly appropriate for Honors students. The argument that such courses give only a confused smattering to the learner is simply not true in their case. They can go deep enough to see how disciplines are related to each other in theory and in practice. And they enjoy contemplating the wider horizons of thought thus opened up.

Departments and fields of concentration will want to organize their work for the Honors degree in their own ways. Some will rely heavily on special proseminars, others on research projects under faculty supervision, still others on tutorial work and comprehensive examinations. It seems doubtful to me that a rigid pattern should be imposed by an Honors Council.

A final protection against deadly bureaucratic influences is a good counseling system in which relatively few Honors students are assigned each counselor. At this point there may have to be some spirit of self-sacrifice in the faculty, some willingness to do this job competently because of its supreme importance. This spirit may show itself more often if the counselors are also members of the Honors Council where they can have a policy-making role. Thus they feel that they are an integral part of the whole Honors effort.

SHOULD HONORS STUDENTS HAVE SPECIAL PRIVILEGES?

The final issue that seems important to me is whether or not Honors students should receive privileges outside the classroom not accorded other students. Such privileges run from those that are academic, like special places to study, through those that are administrative,

like permission to register first for courses, to those that are clearly non-academic, like exemption from dormitory rules about hours and the like.

We have found at Michigan a sharp split on this issue both in the faculty and among Honors students. (We do not know the view of the non-Honors students.) A majority of the members of our Honors Council feel that privileges should be limited to those closely connected with academic matters. They think an Honors study room is unobjectionable, and they go along with special evening meetings at which members of the faculty discuss their research. They might even think it all right for Honors students to register early and thus get their pick of the non-Honors courses they are going to take (though I am not sure of this). An Honors lounge is just within the margin of acceptability. They see that it might conduce to intellectual interchange, but they are wary of creating jealousies in the remainder of the student body and of developing intellectual snobbishness in the Honors students.

Privileges which are further from the academic they tend to reject as extraneous. Thus they laughed some students down when they suggested late permission as something which would stimulate scholarly emulation in other students, and they have not been in favor of separate housing. They argue that we need to diffuse the influence of Honors students throughout the student body, though I suspect this is a rationalization and that the real reason is an unwillingness to risk a split in the student body.

These seem to be the views of the majority in the Council, but there is a minority with another position. Its members are in favor of separate housing, because they believe it would serve to maintain the intellectual atmosphere of the Honors classes which now becomes dissipated in the mediocrity of dormitory and fraternity and sorority life. They are less concerned with the jealousies of the non-Honors students and are willing to risk some intellectual snobbery, if as a result a true intellectual elite appears.

Much the same split is to be found among the Honors students and with much the some reasoning on both sides. Like others of the five issues, this one will be viewed differently at different institutions because of variations in size of the student body, campus traditions, faculty outlook and many other factors. It is, perhaps, not immediately as important as the others, but in the long run to adopt a policy on it that will be locally most effective may be crucial for the success of an Honors program.

These, then, are five of the central issues that will have to be faced by those who are moving into this booby-trapped area. It has been my purpose only to give a warning, as German signs that were posted in Normandy fields warned their personnel: Achtung, Minen! Whether there are actually mines in the field of Honors work or not, it is well to be prepared for rude surprises.

In closing these remarks, I would like to take advantage of this opportunity to express my profound admiration for what Professor Cohen has done as Director of the Inter-university Committee on the Superior Student. He has been tireless in visiting institutions, resourceful in his counsel and so filled with enthusiasm for the Honors idea that he has inspired others to follow the torch that he holds aloft. American higher education will always be indebted to him for the job that he has done and is doing.

The Mathematics Department at WASHINGTON STATE UNIVERSITY offers advanced placement and Honors sections for gifted students in mathematics. Under the advanced placement program, a student with adequate preparation may begin his university work in mathematics with either the first or second semester of combined analytic geometry and calculus. Moreover, if his performance in the first course in mathematics is sufficiently good, he will automatically receive credit, with no grade specified, for the omitted courses, starting with the usual beginning course, college algebra and trigonometry.

The Honors sections are offered in each course in which the enrollment is sufficiently large. Participation is voluntary but an effort is made to include the top twenty percent enrolled in the course.

Formally the Honors sections are much like the ordinary ones: they carry the same credit, are scheduled in the same way, and often use the same textbooks. The emphasis, however, is altogether different. The students in an Honors section learn the mechanical aspects of the subject easily, and much of the time that is ordinarily spent on matters of routine can be given to a more thorough study of the principles, to historical aspects of the subject and interesting applications, and to details too difficult for many students. There are also more opportunities to digress into some of the attractive by-paths of mathematics. In one current Honors section, for example, students are preparing reports on some relevant articles in the "American Mathematical Monthly."

This mathematics program will be integrated into the university-wide program now being planned by the Honors Council headed by SIDNEY G. HACKER, Chairman of the Mathematics Department. Adoption of the program by the faculty has just been announced.

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Good students in the new five year electrical engineering program at OHIO STATE UNIVERSITY will be able to win masters' as well as bachelors' degrees in the added time.

The broadened program, said Dean HAROLD A. BOLTZ of the University's COLLEGE OF ENGINEERING, is divided into two parts: 1) A two-year pre-professional curriculum, common for all branches of engineering, will stress English, mathematics, physics, chemistry, engineering, drawing, mechanics, history and literature, with electives in economics, sociology, psychology, philosophy and the arts. 2) A three-year broadened professional curriculum will emphasize mathematics and basic science at the expense of "know-how" courses.

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IRVIN LAVINE, Professor of Chemical Engineering and Chairman of the Honors Committee in the COLLEGE OF TECHNOLOGY, UNIVERSITY OF NEW HAMPSHIRE, reports that the College has approved an Honors Program to begin next year.

Three scientists at AMHERST COLLEGE—a biologist, HENRY YOST, JR.; a chemist, ALLEN KNOPF; and a physicist, BRUCE BENSON—have established a joint seminar in biophysics with a group of twelve students interested in the growing number of problems which involve all three sciences. The seminar is not a formal course and carries no credit. The undergraduates taking part are senior Honors students in biology, physics and chemistry. One of the objectives is to give undergraduates an idea of the areas open in the general field of biophysics. Among the subjects considered so far have been certain problems in photosynthesis, conversion of chemical energy into a useful form and muscular contraction. The mechanism of conduction of nerve impulses will be considered in later seminars. The three faculty members are enthusiastic about the enterprise. They hope that in the future juniors will also take part and that as a result of their participation some of them will get ideas for their Honors research projects.

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An Honors Scholar Program has been established at the UNIVERSITY OF MICHIGAN SCHOOL OF MUSIC for the very few and extraordinary students whose achievements, maturity and strength of purpose, capacity for learning and, above all, musical and scholarly promise, are outstanding. An Honors Scholar is granted certain freedoms from standardized curricular programs. His program of studies and course elections are planned in terms of his own aims and capacities and are carried out under the guidance of a special Honors adviser. Scholars are selected from undergraduate applicants who have been in the School at least one academic year and whose average at the time of application is approximately 3.5 or higher. Encouragement and support is given for such extra activities as special recitals, public appearances, publications and radio and television broadcasts.

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All ordinary graduation requirements are waived for thirty highest ranking juniors and seniors in the University Scholars Program at the UNIVERSITY OF CONNECTICUT. Each Scholar works on a project designed specifically for him by a special committee. The degree is granted as soon as his committee indicates that the Scholar has completed the requirements set for him. "The Scholars have many privileges, including waiver of the University fees," writes Provost ALBERT E. WAUGH, "but the major feature of the program is that we set up completely individualized requirements for each of these outstanding students and try to have them follow programs which will be to their own individual best advantage. Some of them continue to pursue regular courses while some give up course work entirely and work on individual study projects and research. Many take a combination of the two approaches."

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A report on Honors counseling and various other aspects of the Honors Program at the UNIVERSITY OF MICHIGAN has been prepared by PHYLLIS E. PILISUK, Research Assistant to the Honors Council of the College of Literature, Science and the Arts. Copies may be obtained from her.

President THOMAS H. HAMILTON of the STATE UNIVERSITY OF NEW YORK has announced the appointment of a Committee on the Exceptionally Able and Diligent Students. The committee, acting for all units of the State University, will inventory and evaluate programs for the gifted developed both within and outside the university. Chairman of the committee is MORRIS MEISTER, President of BRONX COMMUNITY COLLEGE and formerly Principal of the Bronx High School of Science.

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The College of Liberal Arts and Science of THE CITY COLLEGE OF NEW YORK will inaugurate a program for superior students in September, 1960. This program, which has been approved by the Board of Higher Education, will be under the direction of a specially selected faculty committee. It will plan with students their courses of study on an individual basis. In most cases students will be able to complete all prescribed courses in the first two years. Some of this work they will take in regular classes, but in history, social science and literature special sections will be created. The junior and senior years will be given over to a program of elective work of considerable depth and scope. Many students, it is expected, will enter the program of departmental Honors, where their work will be on a tutorial basis. There will also be special seminars in addition to the rich program of elective work now offered in many fields.

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High School ENGLISH teachers have been giving increased attention to the needs of the superior students in their subject. A brochure on "Practices in Teaching Gifted Students in English" has been prepared by the English Department of the JAMAICA HIGH SCHOOL (New York) and is available for one dollar a copy from the department chairman, JOSEPH MERSAND, a past president of the N.C.T.E. It contains descriptions of the work done in the department's Honors classes and concludes with bibliographies of works on the teaching of English to bright students and on "Creativity."

"Developments in English Honors Programs in the Public High Schools," is the title of an article by RICHARD A. MEADE, Professor of Education at the UNIVERSITY OF VIRGINIA, appearing in the NCA-STS NEWSLETTER (April, 1960).

The Committee on English Programs for High School Students of Superior Ability of THE NATIONAL COUNCIL OF TEACHERS OF ENGLISH, under the chairmanship of ARNO JEWETT, has just published its report entitled, "English for the Academically Talented in the Secondary Schools." It is available for one dollar a copy from the National Education Association, 1201 Sixteenth Street, N.W., Washington 6, D. C.

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The role and problems of talented women were among the subjects studied in a Conference on the Present Status and Prospective Trends of Research on the Education of Women sponsored by the American Council on Education in 1957. A report, edited by OPAL D. DAVID and entitled the *Education of Women*, was published by the ACE last year.

PRINCETON UNIVERSITY, in cooperation with COLGATE, COLUMBIA, RUTGERS and SWARTHMORE, is inaugurating an experimental summer study program in Europe designed for the most able undergraduates of the above colleges interested in the general field of international affairs. Fnancial support is being provided by the CARNEGIE CORPORATION.

The three-year program, to commence in 1960, will be integrated into the students' regular college work. The emphasis will be on independent research and writing, but the projects will be so organized that each student will always be aware that he is part of a joint enterprise.

During the spring semester the students will formally prepare themselves for the summer in Europe. For the first two weeks in Europe the group will meet together in daily seminars. Each student will then leave the central headquarters and travel to such other places in Western Europe as had previously been determined as most appropriate for continuing his study. In a truly cross-cultural experience, whenever feasible, the student will live for one month with a host family selected by The Experiment in International Living. After two months the entire group will reassemble for a final session of about two weeks. Each student will later prepare a thesis equivalent at least to the work of one year-long senior course.

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GRINNELL COLLEGE (Iowa) participates in a "Washington Semester" program with the AMERICAN UNIVERSITY in Washington, D. C. This program, of particular interest to students concentrating in political science or history, permits a qualified student to study in Washington while maintaining his enrollment at Grinnell. It is ordinarily undertaken during the first semester of the junior year.

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GRANTS

SWARTHMORE COLLEGE reports the second year of a grant from the DOLFINGER-McMAHON FOUNDATION under which ten gifted students may pursue independent research during the summer between their junior and senior years. Funds have been provided by the CHARLES F. KETTERING FOUNDATION to enable gifted students at EARLHAM COLLEGE to undertake summer research in a number of projects.

CHANGE OF ADDRESS

We request that our readers notify the ICSS office of changes of address.

the superior student

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